American Electro-platers' Society

(An Educational Society)

Chartered 1909

MONTHLY REVIEW

APRIL, 1915

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I shall pass through this world but once. Any good thing, therefore, that I can do, or any kindness that I can show to any human being, let me do it now. Let me neither defer nor neglect it, for I shall not pass this way again.—Amiel.

APR 24 1915

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Vol. 1 APRIL, 1915 No. 11

Editorial

WHAT THE A. E. S. HAS ACCOMPLISHED

I have been requested by our esteemed Editor-in-Chief to write the editorial for the present number of the Monthly Review, and having read the splendid editorials in past issues I feel that my pen will be unable to do justice to what has already been said or add anything to them that will prove of unusual interest to the members of the Society.

When I first conceived the thought of a society of electro-platers, it was my earnest desire to break down the barriers of reserve with which the American electro-plater had surrounded himself, and to come out into the broad daylight of publicity and dispel the shadows and darkness that enveloped him because of his own personal opinions regarding his profession.

The American Electro-platers' Society has done much to accomplish this result, and we find its votaries, at least, the greater part of them, willing to broaden their ideas and to increase their knowledge of their profession by intercourse with each other and in the discussion of vital subjects that evolve from day to day in their vocations at the regular meetings of the different branches. All this tends to make a better plater, broadens his mind and gives him an opportunity, through the columns of the Review, to voice his sentiments and prove that he can learn something every day that will benefit himself and his profession if he will only let his true nature come to the surface and give vent to his personal opinions in a true impersonal manner. Also to do this without hope of reward and for no mercenary motive except to increase his common stock of knowledge and be of some service to his fellow members of the American Electro-platers' Society. In other words, willing to give and receive the benefits of the Society according to the obligations he assumed when he became one of its members.

Some time ago I was present at a regular meeting of one of our branches, and during the evening, when the subject of increasing the membership was brought up, one of the members thought that the membership could be increased if the prospective member could be brought to realize that he did not have to give up all he knew when he became a member. Unfortunately, this dark age idea still exists in the minds of some of

the members, and all I can say to them and such prospective members is, poor hyphenated Americans.

It is free thought, free speech and free education that has made America the foremost nation of the world. See what she has accomplished in a hundred years or more, while back of the older nations there is a thousand years or more of existence. In this melting pot of the nations the best has been brought out of the gray matter of the brain, but still there are men that should be living in the middle ages as far as progress is concerned, because the gray matter is still shriveled in their brains and has not expanded to the point of the broad American freedom of thought and action that has made our country what it is today. It is the human brain, the window of the soul of the true American people, that make them put out their hands to help the less fortunate. This is what is expected of every true member of the American Electro-platers' Society, or the motto of the Society, "KNOWLEDGE IS POWER," stands for nothing and is meaningless.

There are still members of the profession who bite their tongues in rage and anguish when they see formulae in trade journals.

Do such men realize that it is not the formula today that tells the story to their employer? It is what is gotten out of a formula in the form of product that tells its monetary value to your employer, the story in dollars and cents, for after all, it is the monetary value of the returns that he is interested in and not the formula; so what do all the published formulae amount to? There is practically nothing new; the component parts may be changed, but chemical products are known to all, although certain chemical combinations may give an added value to the formula. It is the metal deposited that tells the story, for of all the materials you use in your solution, the metal alone is the only material of any value to you. There is such a thing as intensified plating, which we shall probably hear more of at the coming convention.

The story of the output of a solution is told from its metallic content and not the degree Beaume at which the solution stands, which so many of the craft, unfortunately, still cling to, and which we know to be a fallacy, except when a new solution is prepared from known quantities of material. The plater's most important proposition today, is to study his solution from the metal content or reducing agent standpoint, which may be either alkaline or acid, depending upon the composition of the solution. And, more important still, to be able to analyze his solution to determine such content or combination.

Intensified plating must result in all modern plants sooner or later, otherwise, when business conditions become again above normal the plater will find he is unable to take care of the output demanded, because he has not kept step with modern ideas. Forget the formula; it is the superior knowledge that you acquire to get 100 per cent. efficiency from the formula that

will tell the best story in the end. Are you equal to the occasion?

In closing, I want to call your attention to an old Quaker saying: "It is not what thee eats that makes thee fat; it is what thee digests. It is not what thee reads that makes thee smart; it is what thee remembers."

So let us all remember that it is not the formula, but what we accomplish with it that counts. And to all true members of the American Electro-platers' Society, I want to call your attention to the splendid little sermon always to be found on page two of the Monthly Review:

"I shall pass through this world but once. Any good thing, therefore, that I can do, or any kindness I can show to any human being, let me do it now. Let me neither defer nor neglect it, for I shall not pass this way again.—Amiel."

CHARLES H. PROCTOR.

Wendell Phillips once said that he learned something from everybody. "None of us know it all. The wisest man that ever lived died with a tremendous lot of knowledge unlearned. No one who has read Maeterlinck's wonderful book, "The Life of the Bee," can say that even such a small body isn't gifted with something akin to Genius. So, let us remember that whenever Knowledge or Experience or Happiness is found, that we are to take it. And then, to give it to someone else, so that they, in turn, may make it possible for someone else to—Take it.

There is a wonderful accumulation of things in Nature—Take it. If you are in business, every day can give you at least one new experience or idea—Take it. As you walk the street, or ride, or sit, there ever hovers about something of priceless value in Knowledge or Character help—Take it. Everyone that you talk to has something for you—Take it. There is something everywhere that has some value for you, but the greatest thing in all life—for you—is YOUR LIFE. Take it—seriously and enthusiastically and make it worthy of life."

The re-organization of Indianapolis Branch has been accomplished with the aid of Supreme President Joseph H. Hansjosten, who went to that city for that purpose, March 27th. This branch went out of existence about a year ago.

At a meeting held in Toledo, Ohio, April 3rd, a branch was organized through the efforts of Supreme President Hansjosten, Supreme Secretary Fraine and Mr. L. D. Cope. As soon as the charter list is made out an application will be made for a temporary charter.

The "METAL RECORD and ELECTRO-PLATER" is the name of a new journal soon to be issued from Bridgeport, Conn., by Harry de Joannis, formerly editor of the "Brass World." It will make a feature of articles of interest to the Electro-plater.

A REVIEW OF REVIEWS

By R. W. Davenport, Detroit Branch.

I believe most of the members of the Society will agree with me when I say that the Monthly Review is fast becoming the most valued perquisite of membership in the A. E. S. It is not alone valuable for the useful information presented, but it is extremely interesting as an index to the personality of the membership and their problems. In looking over the January number, I found inspiration for much thought, and it is hoped that some of the following comments may be found helpful.

The contrasts presented in this number are striking—possibly it was edited so as to purposely emphasize this spirit of contrast. For example: "Testing Plating Room Chemicals," by Wm. Voss of New York, is an excellent plea for empirical chemistry in the plating room, while in "What the Plater Actually Needs to Know," E. S. Thompson of Chicago presents a rather scathing arraignment of Chemistry in general, and the analytical chemistry of Mr. Voss in particular. On "Spotting Out," the article by Mr. Brown, assails Mr. Schulte's theory, while Mr. Thompson "disagrees with all **except** Mr. Schulte."

Under the title of "Criticising the Critic," Mr. Liscomb suggests editorially that a central committee be formed to assign one subject to each branch, thus getting a symposium on that one subject. Some such scheme must be followed at once if the Review is to be saved from chaos. Few of us are able to consider a subject in a detached manner, and none of us has any right to discussion in the Review unless he is willing and able to make his article entirely impersonal.

From a considerable acquaintance with the work of other societies, such as the A. I. E. E., the A. E. S. (American Electrochemical Society) and the A. S. M. E., and also the semi-technical educational work of such bodies as the National Commercial Gas Association, I as convinced that the Review could profitably undertake to present rational courses of study in electricity, chemistry and electro-chemistry. Surely the personnel of the Society is such that a logical, coherent systematic presentation of these sciences in their bearing upon plating would be preferred to a hodge-podge of unrelated personal experiences.

This does not mean that individual and spontaneous comments would be discouraged. There should always be a Forum for the free discussion of individual problems, and a "Questions and Answer" column should be run in connection with it. But my plea is for an **objective** in the Review. Why not make it a hand-book, a text-book, a journal as well as a review?

With such men as are now numbered among your members, including several college instructors, no difficulty should be found in making arrangements for courses of instruction along the lines suggested, and those branches having access to laboratories could use the Review as a text-book, while those who are

still struggling to get facilities, would be encouraged to further efforts.

Possibly I am mistaken in believing that the readers of the Review **want** to study. Perhaps the average member prefers to casually "read over" accounts of personal experiences of other platers, rather than spend a number of hours in concentrated and rather laborious effort over a **lesson.** Quite possibly the average member feels that he has nothing to learn in electricity, chemistry, and electro-chemistry. But if the average member **does** want to learn these things, the Review is the place to get them.

As to the need of greater familiarity with the principles of physics and chemistry, no better example could be found than this very January Review I have taken as my text.

Most of the material in it would have never been written if all the writers shared Mr. Hogaboom's perspective—they would hesitate to rush in where Angels fear to tread.

Mr. Thompson would learn from a ten-minute study of Ohm's Law that adjusting the field rheostat not only raised the line voltage, but simultaneously increased the current density at the electrodes, and that by cutting in more resistance, at the tank rheostat, he again lowered the voltage across the electrodes, dropping the current density simultaneously. Even a very elementary study of the laws of electrolysis would teach Mr. Thompson that he cannot use "amperage" and "watts" synonymously, and that only ampere hours define the extent of the actual effects, while the voltage is effective only in forcing the current through the Ohmic resistance and against the counter-voltage of his tank. He would also learn the decomposition voltages of the various compounds used, and would acquire the habit of observing the voltage, amperage, current density per unit area, counter E. M. F. or polarization and specific resistance of electrolyte for each job of work, so that when an emergency arose, he could promptly focus all his past experience upon it. A very short course in chemistry—not analytical—would enable him to answer his own questions as to pickles. He would see how simply the reaction between an acid and a metal results in salts of the metal with the liberation of hydrogen. The saponification of grease by alkalis, forming soluble compounds called soaps could be made clear in one evening. The principals of electrolysis, even the simple basic laws, would suffice to show him how an electrolyte is broken up or "ionized," and the reactions by which nickel sulphate is broken up into 'nickel' and 'sulphate,' the nickel going to the cathode and the sulphate to the anode.

Further study would open up the fascinating realm of the binding forces of matter, and the plating of copper onto iron from its sulphate "without the aid of an electric current" would be seen to involve an **internal** current. The study of the laws of light would quickly explain how the colors of oxid films are

caused both by the splitting up and absorption of the waves, and the beautiful relationship existing between the colors would be discerned.

Above all, Mr. Thompson would learn, I think that he has nothing to fear from the "swelled head high school graduate" nor any other person with a superficial knowledge. The thing to fear is a swelled head itself.

I have chosen the article of Mr. Thompson as a text, merely because it is typical, not at all as a subject of criticism; and my text might as well have been one of a dozen other papers. As the members of this branch know, I am not a plater, and my interest in the society is largely personal and entirely altruistic. Therefore, I trust Mr. Thompson will bear with me.

Perhaps I am all wrong in premising the need of systematic instruction in the Review, for a **need** exists only in the mind, and unless you **feel** the need it does not exist for **you.** Unless the average plater feels deeply his personal need of such work, no good end would be achieved by undertaking it. But if the average member does feel the need, I will say that my admiration for him is unbounded, and that the society of working men composed of such as he is, I believe, unique in industrial history, and raises a standard so high as to command universal respect and co-operation.

REACTIONS OF A NICKEL SOLUTION

(The basis of a lecture given with blackboard illustrations by E. S. Thompson before the Cleveland Branch, Feb. 27, 1915. The original paper would fill many pages of the Monthly Review. It was condensed by the author to a statement of some of the texts.—Editor.)

I cannot go into the fundamental principles of electricity. That subject covers too much ground and would require many hours in telling. But to make my remarks consistent I must touch upon electricity. It is an element, the educt of other elements, and produced by the violent agitation or combustion of other elements.

The form of electricity which we use is an expanded form of energy reduced to an element by the combination of other elements in our solutions. The elements of the solution do not merely conduct electricity, but take it into combination, forming new compounds. Whether it combines with hydrogen to form water I do not know, nor do I believe we will ever know, as we cannot analyze it. We have the compound only as long as we have electricity entering the solution. It is because of its tendency to combine with other elements and the ease with which it separates from them that makes it so valuable in the plating room

There is no negative electricity. There is only positive. Berzelius combines it with hydrogen in the decomposition of water, and I am convinced that he is right. The fact that oxy-

gen is liberated at the point where electricity enters a solution and hydrogen is set free where it leaves the solution is proof that the compound H_2E is formed. In the electrolyzing of a nickel solution it is very desirable to combine the E. with H. only. The ionization of the Ni atom is undesirable for this reason. Since E. combines with H., E. must have the same properties as oxygen or at least analogous to it.

Since the molecular weight of the double salt of nickel is 394.7 and the weight of the oxygen in the double salt is 224, it follows that the combining of more oxygen with the molecule would give a peroxide of nickel, forming a separate compound from the other elements in the solution. This is what really occurs in a saturated solution of double salts:—If the current is increased until water is decomposed, part of the hydrogen of the solution uniting with part of the electricity, the E. and H. combining only after $Ni(SO_4)_2$ has been decomposed, and we have nickel deposited as a direct action of the electric current, the oxygen undergoing quiescent combination and burning the deposit.

That Berzelius is correct in his theory, so far as the solutions of nickel, cyanide copper, brass and bronze are concerned, I am sure of in my own mind. That the ionization of the metal atom in other solutions is necessary to a satisfactory deposit, I am equally sure, also the ionization of the metal solvent only in still other solutions being necessary. We must learn to make the distinction between electrical action and chemical action; between primary and secondary reactions, and between ionization of the solvent for metal, the solvent for salt and the metal itself.

As ionization is popularly accepted, it is wrong. The deposition of metals is not the result of electric action, in that like poles repel and opposite poles attract. The separation of electricity from its compound in the solution is due to the electric vacuum on the generator. The deposition of metals is by replacement of the elements set free by the electricity at the cathode, creating a vacuum. Thus Ni replaces H. E. because it is only feebly held by the molecular tension because E. has set free two of the elements necessary to the solution of Ni, and it rushes into the vacuum created by the decomposition of H. E. This is the most desirable condition in depositing nickel.

There are other compounds or elements which are deposited with the nickel in a saturated solution, and they have been referred to in the early part of this paper. Nickel is deposited by replacement of another element or compound.

The migration of the molecule from anode to cathode is by osmatic pressure. The return of the elements set free at the cathode is by chemical affinity. Thus the hydrogen set free at the cathode goes back to meet and combine with the oxygen forced out of the anode.

The element which forces out the undesirable oxygen from

the nickel and combines with electricity without combustion and and consequent burning of nickel is chlorine. We cannot use hydrochloric acid to any great extent owing to free acid being in solution and attacking the work to be plated. We must use the chlorine combined with a base to neutrality. Chloride of sodium comes the nearest to filling the want in a nickel solution. Chloride of ammonia is not desirable owing to the loss of ammonia gas and the solution becoming acid.

The current, when raised above the quantity which will combine with the elements in the solution, forces nickel and sulphur out. This is the cause of the mud in the bottom of the tank, which is usually sulphide of nickel and iron.

Peeling has been explained, also one cause of pitting. Mr. Ter Doest was right when he said that pitting is usually caused by particles floating about in the solution and settling on the work being plated. These particles are precipitates, or solid matter direct from the anode (carbon, for instance) and their weight being not quite equal to the specific gravity of the solution they float about much as ice floats in water. They are usually found in rich solutions or in solutions lower in density in which strong currents are employed. The remedy for pitting is the liberation of more hydrogen so that the cause will be forced away.

Strong currents of electricity are a waste of nickel salts, but the waste is many times overbalanced by the saving in time where speed is desired.

What are known as conducting salts, are not conducting salts. They are salts which contain an element that displaces oxygen or with which electricity will combine without combustion. The theory that free hydrogen remains in the solution after the current is interrupted is a fallacy. The immersing of iron sheets in the solution after the close of the day's work do not remove hydrogen. They remove oxygen and free acid. Hydrogen and iron do not combine chemically.

AN OLD BRASS SOLUTION

By J. H. Ter Doest, Cleveland Branch

I am at present engaged in brass plating to a limited extent on work that has to be bright plated, but most of which has to be buffed and not cut through. The bright plating being necessary on account of the highly chased designs which could not be buffed unless plated bright. I do not like to speak of anything that is not clear in my mind and of no value, so the following is from actual experience and not simply something I have read or heard about.

The solution I am about to speak of, is one I fell heir to about three years ago. It was then anything but a good solution, plating red and white on the same article at any voltage, and blistered also at any and all voltages. I worked a long time with that solution to make it plate brass, and spent enough

money on it to make a new one, but when one goes into a new job he has to fix up the old solutions or he doesn't make good. When I got through with that solution it stood 10 degrees Beaume and plated a nice green yellow brass, and does today. A sample is here shown. This solution has quite a lot of inert matter in it, as, according to my test, it contains less than one ounce of free cyanide per gallon of solution and the necessary metal to make up a working solution, which should stand not more than 5 degrees Beaume if inert matter were left out, but it does good work, and as fast as is necessary for the requiremnts of the place. When I had this solution in good order I tested it for free cyanide in the following manner: I prepared a solution of 1 oz. of cyanide in one gallon of water. I then made up a nitrate of silver solution of about one half grain to the cubic centimeter of water, or to the exact strength so that it took 6 cc. of nitrate solution to saturate 37.8 cc. of the cyanide solution, showing, if it took 6 cc. of this solution to saturate 37.8 cc. of brass solution, it contained exactly 1 oz. of free cyanide per gallon.

Now the reason I say to make it this way is, because, if you get fused nitrate of silver and dissolve it in water there will always be a precipitate, even if distilled water is used and, consequently, cannot be made exact.

I next take 37.8 cc. of the brass solution, and from a burrette I allow this silver solution, drop by drop, to mix with the brass solution, stirring all the while, until the precipitate that is at first formed dissolves with difficulty, then go very carefully, and stop after each drop and see that it is dissolved before adding another drop until it will not dissolve any more. Now read off on your burrette how many cc. of silver solution was used and divide it by 6 and you have it in ounces per gallon. It stands to reason that, at any other time you may test it, if it takes the same amount of silver solution of the same strength, it has the same amount of free cyanide, or it can be easily figured how much it lacks or needs, always taking into consideration the degrees Beaume of concentration of the solution, as a solution standing 20 deg. Beaume should have two times as much free cyanide as a solution standing only 10 deg. Beaume. Suppose, for instance, it took 7 cc. of silver solution to concentrate the solution that stands 10 deg. Beaume, then 1 cc. would be about the relative proportion to use for a solution standing 20 deg. Beaume. Now for the metal content, take 37.8 cc. of the solution and precipitate the metal out with sulphuric acid, run through a previously weighed filter and the difference in weight after washing and drying is, I think, cyanide of copper. I redissolved this in cyanide and had a copper solution, no zinc showing at all.

While I do not think this method is very good, I give it here simply because, in four different tests it varied less than 5 grs. per gallon, but as cyanide of copper seems not to precipitiate

out of sulphate of copper or vice versa without a remainder left in solution, I have not much faith in the method.

As each solution must be looked upon as an individual solution on account of the inert matter that accumulates in cyanide solutions and the difference in the work done in it in relation to the anode surface, and other things over which the plater has no control, it is impossible to say that a certain solution is best for all purposes, and the judgment of the plater must be used, as when it plates too slow, on account of inert matter, it is best to make a new solution, but, of course, that depends on the amount of work one has to do and the time he has to do it in.

To sum up, I will say that the solution should contain enough free cyanide to keep the anodes clean, so that at the same voltage the same amount of current goes through a given amount of work, if it does not it is quite evident that the solution lacks free cyanide. On the other hand, if the solution does not plate fast enough with the amount of cyanide necessary to keep the anodes clean there is a lack of metal in the solution. I run mine at 2½ volts when the tank is full of work and anodes clean enough not to change in resistance in an all day run but no more. It takes 4 cc. of the foregoing silver solution when diluted to 5 deg. Beaume with distilled water. I wish to state here that the tests must always be taken at the same density, as this solution takes 5½ cc. to saturate it at 10 deg. Beaume, and only 4 cc. when the same amount is diluted to 5 deg. Beaume, after repeated trials, and I did not allow my judgement of the stop point to be influenced by watching the burette, but placed a cover over it and watched the solution under test only. Mr. Werft, our secretary, was a witness to this and can bear me out in this statement. The precipitate from 37.8 cc. weighed 400 grs. with the solution standing at 10 deg. Beaume.

I maintain this solution almost entirely with cyanide, getting the metal from the anodes, using the carbonates of copper and zinc when necessary. I never use bisulphite or carbonate of soda in a brass solution, and use arsenic for a brightener in 30 grain doses, dissolved in cyanide and used as made. I have never had much success with a stock solution of arsenic, but was always in trouble. As soon as the lower corners of the work show the least smut, I dissolve the 30 grains of arsenic in cyanide and put it in at once. I never allow it to get too dull and this 30 grains is for a 350 gallon solution. It would be hard to find something to beat arsenic. The color is good and it can be as bright dipped as if no arsenic were used in the solution.

I have at one time used ammonia, but find the work tarnishes too fast when plated in a solution containing this article, while in this solution it stays as good as solid brass.

In putting metal into a solution, I use two parts copper and one part zinc. If work is not plating the right color and is red

on the high lights and yellow in the background I add copper. If yellow on the high lights and red in background I add zinc.

Another thing that is important to take into consideration is the distance between the anode and cathode rods, which in my case is nine inches. If this is reduced to four and a half inches the same solution will not keep the anodes clean with the same work, voltage and current, and requires more free cyanide when anode and cathode are closer together. I run the work very slowly as the solution is overloaded with carbonates. A tank full, or 12 racks, 2½ volts, 30 amperes; 6 racks, 2 volts, 15 amperes; 3 racks, 1 volt, 7½ amperes; 1 rack, 1 volt, 2½ amperes. Now it will be observed that the amperes are directly proportional to the work, but with a constant voltage the work will not stay bright. You have also noticed that by the test my solution has but ⅔ oz. free cyanide per gallon and only a trifle over 1 oz. of metal. I think a stronger solution would do quicker work, but as I can do all the work that is required of me, and the quality cannot be beaten, I shall keep this solution until it will not fill my requirements.

COPPER CYANIDE SOLUTIONS

B. E. S. Thompson *

I beg to call your attention to a paper read before the Lewis Institute, this city, by Dr. Max Weber, discussing Copper Cyanide Solutions. In this paper, which the majority of you heard read, Dr. Weber states that Na is separated from its combination with $NaCuCy_2$ and serves as the conductor for the current to the cathode. Not being present, I do not know what was said in discussing the paper, but am of the opinion, that in a properly balanced solution, the Doctor is wrong. Electricity combines with the hydrogen of the free water in the solution, leaving the sodium-copper-cyanogen molecule independent. Copper, as the Doctor states, would be deposited only as a secondary reaction, leaving the NaCy in solution, the copper replacing the H_2E at the cathode. This is what takes place when there is free water enough in the solution that the hydrogen will take up all the electricity which is being conducted into the solution. When we raise the quantity of E above the volume of O not taken up by the solute, E combines with Na to the extent of all that H does not hold, and Na is discharged at the cathode as well as H and Cu.

If all of the H_2O is taken up by the Cy, and Cy saturated with CuCy, then E would combine with HCy and deposit Na with Cu as a secodary reaction. Right here is where we get Schulte's theory of spotting out when KCy is used instead of NaCy. As K cannot exist under this condition it is occluded as HK, and the moment it is exposed to water or a moist atmosphere it takes

* Read before Chicago Branch, March 27, 1915.

the form of KOH and spotting out occurs. I do not believe that KCy or NaCy can be deposited either by replacement of H_2E or as a secondary reaction, owing to the readiness with which Cy dissolves in water.

I could not hope to cope with the learned Doctor in figuring equations, but I believe the methods shown below would be the proper way to figure the equation in a properly concentrated cyanide solution

Solution, X H_2O+$NaCuCy_2$

At Anode

X H_2O+NaCuCy+E =

X H_2O+H_2E+$NaCuCy_2$ =

At Cathode

X H_2O+2NaCy+E+H+Cu.

It will be seen that I have taken E into the equation, displacing the oxygen, (which combines with Cu at the anode) and E is separated first at the cathode and H is replaced by Cu. This would make the deposition of copper a secondary reaction as the Doctor states, filling the vacuum caused by the decomposition of H_2E by the negative electrode.

BRASS PLATING.

By James Purcell, Cleveland Branch

At our last meeting I was requested to prepare a paper on brass plating for this evening. The brass solution I have found easiest to operate is one that is not filled with a lot of unnecessary material. For a 275 gallon solution I fill my tank two thirds full of water and then add 115 pounds of potassium cyanide, when this is dissolved I add 63 pounds carbonate of copper which is first mixed with 30 gallons hot water and stir this until the blue color disappears. I then dissolve 38 pounds of cyanide in 15 gallons cold water and add to the tank for free cyanide. After this I add 26 pounds carbonate of potash which is dissolved in 10 gallons of water stirring well the whole solution. My connections are then made to the tank and brass anodes hung in. (I prefer using anodes about 4 inches wide because I think the narrow anodes maintains the solution in better condition than do the wider ones.) I then connect some work to the work rod and allow to run while making up a zinc solution. This I do by dissolving 2 pounds of cyanide in each gallon of water, to which I add carbonate of zinc until the cyanide refuses to dissolve any more. I then have a saturated solution. When the zinc solution has settled I proceed to add it to the copper solution in the tank. This I continue to do until the work suspended in the solution plates a nice yellow brass. At first it will plate a red bronze, by the additon of more zinc this will turn to a light bronze, by continuing to add zinc a yellow brass color will be obtained.

Overcoming Difficulties: Deposit red and dark, add ammonia; if bright red, add zinc solution. Deposit too light in color, add copper solution. No deposit forms and work gases

freely, add two parts carbonate of copper and one part carbonate of zinc dissolved in water. Anodes coat over after running a short time so that current will not pass, add ammonia and cyanide. Deposit is of several colors on one article, add cyanide, a little at a time.

COMMENT AND CRITICISM

The following three questions appeared in the February Review. Question No. 1. "Why is it that a strongly adherent deposit of nickel is not obtained on electrically cleaned polished steel surfaces without an intermediate coating of copper?"

Question 2. "What is a good substitute for benzine and gasoline to remove grease? Something is desired that can be used cold and that is not inflamable."

Question No. 3. "What is the best lubricant to be used in connection with steel ball burnishing of steel parts?"

Parties were communicated with whom it was thought could answer the above, and the following replies were received:

"I believe that when steel or cast iron is electro cleaned the work is magnetized, and nickel being more or less magnetic, when the work is placed in the nickel solution and the current turned on, a reaction takes place that causes an oxide of iron to form on the work which prevents a strongly adherent deposit to form."

CHARLES WERFT.

It is generally considered difficult to get a coating of nickel upon freshly pickled steel surfaces. There appears to be a film resulting from the acid dip which causes the difficulty. This difficulty can be overcome, however, by rinsing carefully with water, and then dipping in a cold solution of sodium cyanide.

We are reliably informed that metal treated in this way will take either a nickel or a zinc plate direct, which will be firmly adherent.

Yours truly,

L. B. JONES,
Chief Chemist, Solvay Process Co.

Mr. Joseph Walters
Dear Sir:

Your letter of March 1st just received this A. M. Hundreds of platers are using the electric cleaner successfully on polished steel work, running the cleansed work directly into the nickel tank and getting firmly adherent durable deposits. So we assume that your question does not intimate that one cannot get an adherent nickel plate on electrically cleaned polished steel without first copper plating it. Rather we feel that the question

brought up by your society is a local one, referring to a particular member's problem.

With the meager data which you furnish us, it is impossible for us to say exactly where this plater's trouble has its source. With no other specific facts at hand, we offer the opinion that the work is not chemically clean when it leaves the electric cleaner, and that the electrolytic cleansing action while immersed in the copper solution, assists in the firm deposit of the copper plate.

We do not approve of the auxiliary use of a copper plating solution to merely accomplish the functioning of a cleansing solution. An electric cleaning solution made up with all the necessary chemicals will when properly operated do all the preliminary cleansing required, thus avoiding the expense incidental to the use of a copper solution as an assisting agent.

With more definite information we might be able to state just why in this particular instance the plater is not getting the proper results from the electric cleaner, and we are always ready to assist the trade in solving cleansing problems.

Yours very truly,

CLEVELAND PLATERS' SUPPLY CO.

In answering question number two the following information was secured. In a recent issue of the Patent Record appeared the following: "Letters patent No. 1,119,781 was granted to Geo. D. Feidt of Philadelphia, for a non-inflammable mixture for the removal of grease from iron and steel. The mixture consists of one volume of Orthophosphoric Acid to two volumes of denatured alcohol and one quarter volume carbon tetrochloride." (Note) A copy of this patent which gives full details can be had by sending five cents in coin (not stamps) to the Commissioner of Patents, Washington, D. C., metioning the patent number.

J. W.

Mr. Joseph Walters.

Dear Sir:

One of the most satisfactory non-inflammable solvents of grease is carbon tetrachloride, CCl_4, whose wholesale price in drums is about twelve cents a pound. I feel sure that it will give you satisfaction.

It is always a pleasure to be of service to a fellow chemist. Be sure to write again, if there is anything more which I can tell you.

Very truly yours,

GEO. SHANNON FORBES.

Prof. Division of Chemistry, Harvard University.

Replying to question number three the following replies were received from those to whom inquiry was made.

"The best lubricant to use in the steel ball burnishing process is a mild, neutral soap."

ABBOTT BALL CO.

"To a quantity of work, balls and water of one bushel capacity, a little soft soap the size of a hen's egg with a piece of cyanide the size of an English walnut dissolved in warm water."

BAIRD MACHINE CO.

In looking over the literature of steel ball burnishing processes the writer was very much impressed with the statement that, "The mixture used with the steel balls is very important, as ordinary soap may stain the work and attack the steel balls on account of the salt and other corrosive elements," also, "It was found that the variation in water between two localities was most surprising. The contents of mineral salts and vegetable matter would run from practically nothing, as in soft water, to nearly saturation (as much as the water would dissolve) in the case of hard water. Every change in the water used, if the solid contents were over a certain percentage, would have some noticeable effect upon the work in the barrel." On more than one occasion it was evident to the writer that the water used in making up plating solutions and for barrel burnishing process the water of different localities gave different results, and I would not be surprised that many of the ill effects in Electro deposition of metals, as for instance pitting, peeling, etc., can be traced to waters containing impurities or objectionable elements for the proper production of Electro plate, and I believe that the reason why laboratory formulas emanating from experienced chemists very seldom prove satisfactory in the hands of Electro-platers commercially, because every condition obtained in the laboratory is ideal or can be made so for the production of a substance—pure chemicals, or chemicals of a known composition—proper weight, right temperature—and lastly, distilled water. It is our hopes that when our office with its duties and cares shall be lifted from our shoulders and given to another to undertake the gathering of data of different localities for the purpose of establishing its relative value in making solutions for plating.

(CCl_4) Carbon tetrachloride is a heavy colorless liquid, boiling at 76 deg.—Thorpe's Dictionary of Chemistry.

Fats and oils contain the fatty acid in combination with glycerine, forming glycerides, and it is from these that soaps are generally made. Soaps are metallic salts of certain non-volatile fatty acids and an alkali salt of the acid.

The three letters in regard to why a non-adherent deposit of nickel is obtained on electrically cleaned polished steel surfaces are interesting. The writer some years ago in experimenting with electric cleaning had cast iron and polished steel articles electrically cleaned at the same time. Both the iron and the steel appeared to be chemically clean but when the castings were broken the nickel did not peel but the nickel plate on the steel peeled when the same test was applied. On further tests it was found not to be the fault of the electric cleainig but the manner of cleaining that caused the trouble. An electric cleaner is no respecter of persons. When it cleans chemically it is clean, be it brass, cast iron or polished steel, the difference is that each must be differently handled. After removal from the electric cleaner, rinsed in clear water and immersed in an acid dip it was found that the hydrogen of the acid would cling to highly polished hard surfaces like steel. Rinsing in water prepartory to hanging in nickel tank did not entirely remove it, and these bubbles, imperceptible to the eye, are what prevented the firm adherence of the nickel plate, but the polished steel after dipping in the acid, rinsing in running water and dipped in a chloride of lime bath, again rinsed in water, and nickled—PRESTO—Our troubles were overcome. Bending and breaking of the articles failed to cause the nickel to come off. This led us to experiment further, and we found what most of us know, that soft iron castings will be more quickly attacked by an acid—i. e., given the same strength of an acid of the same temperature it will dissolve a soft metal like cast iron faster than a hard metal—steel, for instance—and when the soft iron is removed from the acid the hydrogen that covers it has practically worn itself out, but on the hard and smooth surface of steel it holds with all its full strength it seems. From these experiments I drew the conclusions that all pickled objects or any articles that have been through an acid dip should be not only rinsed in water to remove the acid, but dipped in an alkali to neutralize the acid before placing it in the nickel vats, and I am corroborated in my view by the statement of Mr. Jones, chief chemist of the Solvay Process, except in the difference of the alkali—he recommends a cyanide dip for the ferrous metals, I prefer lime.

JOSEPH WALTERS.

To the Editor of the Monthly Review—

On criticism. I wish to state that I have read with interest all that has been published in the Review on the subject, and I think enough has been said in the matter, and think it should be dropped entirely. But let the committee on "Comment and Criticism" go on with its work of criticizing and commenting on any and all articles and papers written, but not the author, and in this way keep out personalities altogether. After a paper has once been published it is open for comment and criticism

by anyone who sees fit to do so. I am sure that I am always glad to see that anyone has interest enough in an article or paper to criticize it.

In answering the question regarding nickel plating on polished steel surfaces electrically cleaned, the deposit not being adherent, I wish to state that I have had some difficulty in this myself, but overcame the trouble. I found that the cyanide dip is a good thing to use as there seems to be a thin film on the steel after it has been electrically cleaned. The process I use is an electric cleaner with a double throw switch. The solution is kept at the boiling point, the work racked or wired ready for plating, hung in the cleaner with the work rod as the negative, then reverse the current so that it becomes the positive, but only for a moment, next dip the work directly into a solution of sulphuric acid standing at 6 deg. Be., then rinse in cold water and pass through a cyanide solution of about 4 deg. Be., back into water and then through a diluted solution of sulphuric acid, about 4 deg. Be., then into cold running water and directly into the nickel solution with the current turned on before hanging work in tank, using a strong current at first and then regulated to the proper amount to plate the work. I find that the operation of cleaning steel in this way gives a good, adherent deposit of nickel.

T. C. EICHSTAEDT.

QUESTIONS

I would like to know how to produce a rust proof black upon hardened and tempered steel parts. These parts are small and made extremely accurate. The process must be cheap as the parts come to me in large quantities.

I should also like to know how to remove very heavy scale from hardened and tempered parts without affecting the steel and altering its size.

WHAT THE BRANCHES ARE DOING

NOTE TO THE SECRETARIES—All correspondence for this department must be in the hands of the editor by the 15th of each month.

SUPREME SOCIETY

Meets first week in June, 1915, at Dayton, Ohio. Secretary, Walter Fraine, 507 Grand Avenue, Dayton, Ohio.

NEW YORK

Meets fourth Friday of each month at 258-262 Pearl Street, New York City, 8 P. M. Secretary, Joseph Minges, 148 Schenck Avenue, Brooklyn, N. Y.

The regular monthly meeting was held Friday, March 26th. After the regular order of business, the laboratory committee gave an interesting demonstration of finding the free cyanide content in a silver solution, which was very interesting and instructive to those present. The committee is also giving a course in chemistry, showing the relation the elements bear to each other, also their attraction for each other, and their combining value with each other, also the breaking down or decomposing of compounds by the electric current, which is of such importance to the modern plater. At our next meeting the committee will give a demonstration of finding the metal content in silver solutions. A discussion on acid copper solutions, addition agents and the amount of free acid used was indulged in and experiences given by several members.

This branch will hold an open meeting in the spring to give the platers an opportunity to inspect our laboratory and to show the benefits of being a member of the A. E. S.

MILWAUKEE

Meets second Wednesday of each month at Marquette University. Secretary, E. C. Yaeger, 962 9th St., Milwaukee, Wis.

The regular meeting was held April 2nd, with a good attendance. Preparations are being made for our first banquet, which will be held May 22nd at the Maryland Hotel. A cordial invitation is extended to all members of the society to help us make this a grand success.

CHICAGO

Meets fourth Saturday of each month, 8 P. M., Western Building, Randolph Street and Michigan Avenue. Secretary, H. E. Willmore, 5911 South Boulevard, Chicago, Ill.

The regular meeting was held March 27th with a fair attendance of members, President O. E. Servis presiding.

The committee in charge of proposed amendments to the Constitution made their report, which was accepted and forwarded to the Supreme Secretary for presentation to the convention.

A paper on "Copper Cyanide Solutions" was read by E. S.

Thompson, in which the author advanced some original theories on their reaction.

A paper was also presented by the secretary on "Soluble and Insoluble Nickel Anodes." Both papers were discussed at length by the members.

It is with sincere regret we record the death of one of our members, Mr. Joseph F. Carr, who died April 6th. Mr. Carr was for a number of years in charge of the plating department of the Stewart-Warner Speedometer Corporation. He is survived by eight children. The body was taken to Cleveland, his former home, for burial.

CLEVELAND

Meets second and last Saturday of each month at Central Y. M. C. A. Secretary, Charles Werft, 331 Strathmore Avenue, Cleveland, Ohio.

At our semi-monthly meeting held March 27th, which was well attended, it was decided to hold the proposed"Smoker" on Saturday, April 24th, at the Pythian Temple.

President Scott read a paper on "Metal Coloring," as also did Mr. Ter Doest on the same subject, both papers being well received. Several members exhibited samples showing four or five colors on a plate that were much admired for beauty of workmanship.

ST. LOUIS

Meets fourth Saturday of each month at Public Library, Assembly Rooms. Secretary, H. H. Williams, 2134 Nebraska Avenue, St. Louis, Mo.

"The Metal Cyanides" was the subject of the evening at the regular meeting of the St. Louis Branch of the American Electro-platers' Society on March 27. Mr. Charles H. Proctor, founder of the American Electro-platers' Society, demonstrated the practical efficiency of the metal cyanides, and Mr. George S. Robins. B. Sc., spoke on the "The Metal Cyanides from the Standpoint of a Chemist." The meeting was held in the lecture room of the McKinley High School, of St. Louis, and was attended by a large number of the members of the society and several invited guests. President Musick, of the St. Louis Branch, introduced the speakers.

Mr. Proctor opened his address with an acknowledgement of thanks for the cordial reception accorded him by the St. Louis Branch, and the hearty welcome extended by President Musick.

"The Metal Cyanides," said Mr. Proctor, "are nothing new; they have been known to the plating world for many years, but with the exception of Silver Cyanide, they have been little used as the means of introducing metal to the bath because heretofore they have been commercially impractical. The Silver Cyanide has been in use for the past generation or two."

"It is only within the past few years that the metal cyanides

have been placed on their present economical basis, and now that the use of them is a decided advantage, the platers are rapidly coming to see the wasteful measures hertofore employed in getting their metal content in solution."

Mr. Proctor then hastily reviewed the various methods employed in dissolving various copper salts, and pointed out the percentage of metal obtained in the use of each one.

"What the plater needs is metal and cyanogen and only these two," said Mr. Proctor, "and on the basis of these two ingredients, he should determine which salt of the metal he is to use in making up his bath. I will make up the solution in this five gallon glass jar before you in the following proportions:

Copper Cyanide	3 ounces
Sodium Cyanide	3 ounces
Water	1 gallon

"You will note that the hydrometer scale reads a density of 3 degrees Beaume. If I had made up this solution using Copper Carbonate, the density would have been 100% greater, and I would have no more metal in solution, and it is the metal which tells the story."

"It is time that the practical electro-plater discarded the Baume scale as a test for solutions since the density may be increased by any material soluble in water, and hence the scale is no recorder of the actual metal content in the bath, which I again emphasize, is the condition which tells the story."

Mr. Proctor then plated various articles of steel and iron using a 2½ volt current. He pointed out the clear bath obtained by the use of the Copper Cyanide, and also showed the copper anodes which, after the plating, were free from any deposit whatsoever, showing that there had been no precipitation of the hydrate of copper from the solution as is frequently the case when the carbonate of copper is employed. The bath responded at once to the current, and the plating was effected very rapidly.

As the time was short, Mr. Proctor did not make up a separate solution for the demonstration of brass plating, but simply added to the copper bath.

Zinc Cyanide	4 ounces
Sodium Cyanide	4 ounces

replaced the copper anodes with brass anodes, and after giving the solution a quick stirring, received a good brass deposit at once.

Mr. Proctor had arranged his apparatus, with the assistance of Mr. Herrmann, of Chicago, in a very neat manner, and every step in his demonstration was plainly visible to all present.

Mr. Robins preceeded Mr. Proctor on the program. He first emphasized upon his audience that the cyanides, although deadly poisons, were simple affairs from the chemical standpoint, and that their actions and reactions were easily to be ascertained. He then explained how cyanides were made.

"The metal cyanides," said Mr. Robins, "are just as much in the family of chemicals as their relatives—the cyanides of the alkali metals—sodium and potassium—with which you are all familiar. I have here a solution of copper sulphate, and by adding a solution of sodium cyanide to it, you note a precipitate which, upon standing, is none other than copper cyanide. So you see there is nothing mysterious in the formation of Copper Cyanide."

Mr. Robins placed on the blackboard the following comparative equations:

Methods of making up Copper Solutions:

A—By Means of Copper Carbonate

1. Copper Carbonate + Sodium Cyanide gives Copper Cyanide
   $CuCO_3$ + 2NaCN $CuCn$
   Sodium Carbonate Cy
   Na_2CO_3 CN

2. Copper Cyanide + Sodium Cyanide gives Cupro Sodium Cyanide
   CuCN + NaCN $CuNa(CN)_2$

B—By Means of Copper Cyanide

3. Copper Cyanide + Sodium Cyanide gives Cupro Sodium Cyanide
   CuCN + NaCN $CuNa(CN)_2$

"As you will note, gentlemen," said Mr. Robins, "equations number 2 and 3 are identically the same. You will note the presence of Sodium Carbonate in the solution as obtained by the use of Copper Carbonate from equation 1. This Sodium Carbonate is absolutely worthless and it is always present whenever you use the Carbonate of Copper. It is this material which loads up your bath to a density of over 100% greater than that obtained when the Copper Cyanide is used to start. You will note that no Sodium Carbonate appears in the reaction. Equation No. 3, representing the solution as made up by means of Copper Cyanide. You will also note free Cyanogen gas liberated in Equation No. 1, due to the instability of the Cupric Cyanide which is first formed. This cyanogen gas is a poison and is dangerous to the health of the plater. You will note that none of this gas is liberated in Equation No. 3.

Mr. Robins then made up a standard solution of Sodium Cyanide, and took weights of Copper Carbonate and Copper Cyanide corresponding to equal weights of Copper in both on the basis that the Copper Carbonate contained 50% Copper and the Copper Cyanide 70% Copper. Upon the addition of an equal weight of Sodium Cyanide from the solution made up of one part of sodium cyanide to four parts of water by weight, Mr. Robins showed the Copper Cyanide dissolved completely to a clear solution.

With the Copper Carbonate, Mr. Robins showed that even upon the addition of twice the amount of sodium cyanide by weight, the copper carbonate would not dissolve.

"Thes experiments," declared Mr. Robins, "show the econ-

have been placed on their present economical basis, and now that the use of them is a decided advantage, the platers are rapidly coming to see the wasteful measures hertofore employed in getting their metal content in solution."

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With the Copper Carbonate, Mr. Robins showed that even upon the addition of twice the amount of sodium cyanide by weight, the copper carbonate would not dissolve.

"Thes experiments," declared Mr. Robins, "show the econ-

omy in cyanide to be gained by the use of Copper Cyanide, and on the blackboard I have placeed comparative cost figures, on the basis of these experiments.

To Put 100 Pounds Metallic Copper in Solution

A—By Means of Copper Carbonate

100 Pounds of Copper equal 200 Pounds of Copper Carbonate at 14 cents per pound	$28.00
400 Pounds Sodium Cyanide (minimum) required, at 24 cents per pound	96.00
Total Cost of Copper in Solution	$124.00

B—By Means of Copper Cyanide

100 Pounds Copper equal 143 Pounds Copper Cyanide at 46 cents per pound	$65.78
100 Pounds Sodium Cyanide required, at 24 cents per pound	34.32
Total Cost of Copper in Solution	$100.10

"The relative cost figures, which show a decided advantage in favor of Copper Cyanide, do not of course, show the practical advisabiliay of using the metal cyanides. This will be conclusively proved to you by Mr. Proctor."

NEWARK

Meets first and third Friday of each month, 8 P. M., 47 Bank Street, Newark, N. J. Secretary, Chas. A. Stiehle, 46 West Madison Avenue, Irvington, N. J.

This branch held semi-monthly meetings as usual. At the last meeting in March, Prof. Joseph Richards, of Lehigh University, Lehigh, Pa., delivered an address entitled, "The A. B. C. of Electro Chemistry." This address was followed by a practical demonstration of the bright nickel plating solution, by Willis R. King, of Newark Branch. Ninety members were present and the interest shown was intense.

At the meeting held Friday, April 2nd, a general discussion on the electro disposition of gold was engaged in, the question still to be decided is, how to get the best and greatest deposit, by the dynamn or by the salt water method? Any information on the subject will be acceptable.

BUFFALO

Meets first Saturday of each month at the University of Buffalo, 8 P. M. Secretary, John G. Murphy, 71 Dingens Street, Buffalo, N. Y.

At the regular meeting held April 3rd, Prof. Childs gave us an informal discussion on aluminum, which was very interesting to all present; this led to other discussions and finished with the plating of aluminum.

Mr. Stephen Wrobeleski was complimented and congratulated for having won the prize in Chemistry at the Technical High School, which all agree he is entitled to as he is very con-

scientious and industrious. The Chemistry department at the school has about 80 members, and it was his first year.

There was a demonstration in Electro-plating Chemistry at the school, March 26th, and a large attendance and about 30 active foremen platers, some of which we expect to enroll as members in the near future.

The class analyzed the different solutions, Copper, Silver, Zinc, Cyanide and Nickel. After the analysis the visitors were taken to the Electrical department which was appreciated. As our Tech. cost $750,000, and is only one of the four high schools completed this year, all costing from $500,000 to $750,000, the educational advantages of Buffalo were apparent.

Buffalo Branch will continue the Chemistry work at the meetings for the benefit of those who were unable to attend the class, and at the same time prepare the members so they will be able to take up the class in Electricity for Electro-plating next year at the school. These classes are only open to members of the Buffalo Branch, A. E. S., and are completed and finished at the end of the year, so that they have to be taken advantage of as they come up, another reason for the necessity of platers joining at once to get full benefit.

Buffalo Branch's message to the other branches is to learn the Chemists' talk and writing by joining the classes, and when standardization arrives Emery Glue's can not understand it.

DETROIT

Meets first Friday of each month at Prismatic Hall, 140 1st Street. Secretary, B. E. Miller, 545 Townsend Avenue, Detroit, Mich.

The regular meeting of this branch was held April 2nd, with President John Schultz in the chair, and a good turn out of members for the nomination of officers for the coming fiscal year were present.

The following visitors were present: Mr. Fred. J. Liscomb, of the Chicago Branch, and Mr. E. Troxler, of Newark Branch, who in turn talked on the subject of laboratory work. A paper was also read by Mr. Davenport.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Penna., 34th and Spruce Streets, Philadelphia, Pa. Secretary, Philip Uhl, 2432 North Twenty-ninth Street, Philadelphia, Pa.

The regular monthly meeting was held Friday, April 2nd. The meeting was well attended by a large number of platers, who were invited for the purpose of interesting them in the Society.

Mr. Walter C. Gold addressed the meeting on the purpose and benefits of membership in the Society. Dr. H. J. Lukens was next introduced and gave a very interesting lecture on silver solutions, outlying the chemicals used, and what took

place in the solution under action of the current. He also strongly advised keeping a proper amount of anode surface exposed so as the free cyanide liberated at the cathode would in turn attack the anode, thereby making it possible to keep up the metallic content of the solution without the frequent addition of silver salts, or, in other words, make the anodes supply the metal. We are looking forward to the May meeting, at which Dr. Lukens will lecture on nickel solutions. All platers in the vicinity will be invited to attend.

DAYTON

Meets first Wednesday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Alphonz Lamoureux, 500 East First Street, Dayton, Ohio.

The regular meeting was held April 7th, at which the following committees were appointed:

Hall and place of Convention: Walter Fraine.

Reception and Entertainment: Messrs. Keyes, Stephens, Suman, Wade, Gordon.

Hotels: J. A. Keyes.

Program: A. Lamoureux, W. Fraine, J. A. Keys.

Finance: F. Hartzell, J. A. Keyes, W. Fraine.

Badges and Printing: C. A. Freund, A. Lamoureux.

Publicity: A. Lamoureux.

Exhibition: Messrs. Lamoureaux, Van Derau, Lantz.

All are working very faithfully and in perfect harmony. The Exhibition Committee asks all who intend making an exhibit to communicate with A. Lamoureux, 500 E. First Street, Dayton, Ohio, so that he can arrange for space for same.

After a general discussion of the details of the Convention, the meeting adjourned at a late hour.

On Saturday, April 10th was held the second annual banquet of Dayton Branch at the Algonquin Hotel. Seats were provided for about fifty guests, including Supreme President Hansjosten, and employers of platers in Dayton and vicinity. After partaking of a sumptuous meal, all present listened to the following program with a great deal of interest.

Introduction ..... Walter Fraine
The Relation of Educational Societies to the Manufacturer....
..... J. H. Hanjosten
Electric Cleaning ..... Forrest Hartzel
Bass Solo—"A Song of Steel" .....Geo. J. Will
Preparation of Iron Castings for Plating ..... Ohmer Stephens
The Value of a Chemist to the Plater ..... Mr. Williams
Preparation of Non-Ferrous Metals for Plating ..... Geo. Lantz
Relation of Manufacturer to Educational Societies .....
..... Mr. Best, Supt. N. C. R. C.
Closing Remarks ..... Toastmaster, Walter Fraine

TORONTO

Meets fourth Thursday of each month at Occidental Hall, Bathurst and Queen Streets. Secretary, Ernest Coles, 13 Laurier Av., Toronto, Ont.

The regular meeting was held March 25th, with President Magill presiding and a good attendance of members. The trouble with the stove plate tarnishing was again brought up and Mr. Wilson of the Toronto Technical School promised to look into the subject and collect data for future reference. The "Platers' Class" has been discontinued until fall, when we open up in our new quarters, which will be open at all times.

The subjects taken up during the past season were the analysis of silver solutions for silver and cyanide, the analysis of nickel solutions, mercury dips, and of the various acids and cleansing agents. The class must be considered a success, as all who attended expressed their satisfaction. The attendance, which was the best in the whole school, must have been very satisfactory to the school executives.

CINCINNATI

Meets once each month at Dennison Hotel, Cincinnati, Ohio. Secretary, F. H. Nordman, 720 Froom Ave., Cincinnati, Ohio.

ROCHESTER

Meets second and fourth Friday of each month at University of Rochester. Secretary, C. V. Haring, 603 Dewey Avenue, Rochester, N. Y.

BRIDGEPORT

Meets third Friday of each month at the office of the Brass World, 260 John Street, Bridgeport, Conn. Secretary, Nelson Barnard, 858 Howard Ave., Bridgeport, Conn.

APPLICATIONS FOR MEMBERSHIP

Newark—
J. D. M'Ganah ..... 261½ S. 18th St., Newark, N. J.
Henry Bergfels ..... 38 Walnut St., Newark, N. J.
J. W. Rosenbaum ..... 79 Austin St., Newark, N. J.
Detroit—
Jack Van Der Leest.....469 Lambert Ave., Detroit, Mich.

ELECTED TO MEMBERSHIP

Cleveland—
Fred. C. Gildon ..... 16425 Wayside Rd., Collinwood, Ohio
J. H. McAuliff ..... 1122 St. Clare St., Cleveland, Ohio
Buffalo—
F. J. Kibler ..... 262 Grape St., Buffalo, N. Y.
Dayton—
Ralph Carr.....220 Milton St., Dayton, Ohio
J. Lahman .....304 Main St., Richmond, Ind.
Wm. Fansher.....123 N. Summit St., Dayton, Ohio
Newark—
Wm. B. Jones ..... 234 Harrison St., Harrison, N. J.

CHANGE OF ADDRESS

Robert Chapman ..... 1022 George St., Chicago, Ill.
Jacob Hay ..... 509 Oak St., Danville, Ill.

PAY YOUR DUES

Remember that the fiscal year begins June 1st, and dues are payable on or before that date. You will save the secretary of your branch a lot of work if you attend to the matter promptly and without notification from him. Members in arrears for dues are not entitled to receive the Monthly Review.